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**(54) Removable perforated panel
for a domestic microwave oven of
the forced hot air circulation type**

(57) A microwave oven of the hot air circulation type comprises a perforated panel (3) separating the cooking chamber (1) from an adjacent fan compartment (5), the panel perforations permitting air circulation but preventing escape of microwave energy from the cooking chamber (1). The panel (3) has a peripheral wall (9) provided with transverse slits (10) to prevent microwave propagation in peripheral directions along the panel wall (9) and a set of spacer elements (13), each of which is arranged to bring a screw (18) into alignment with a bore (16) in the panel (3) for securing the panel (3) to an oven wall member (4) outwardly defining the fan compartment (5). This panel (3)

can readily be mounted during oven assembly and, when mounted, it satisfies the requirements on air circulation and microwave energy sealing, but it can also readily be removed when access to the fan compartment (5) is called for.

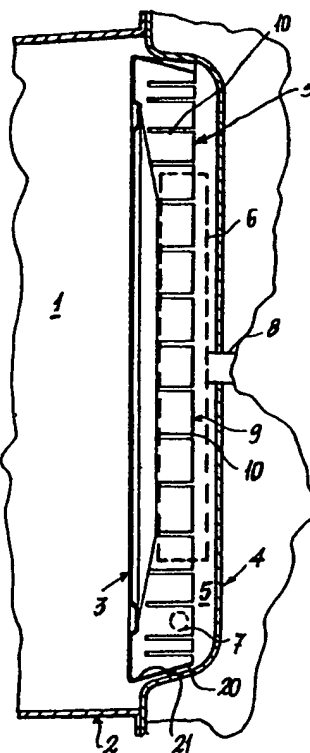


Fig. 2

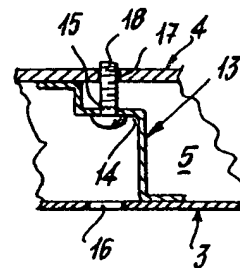


Fig. 4

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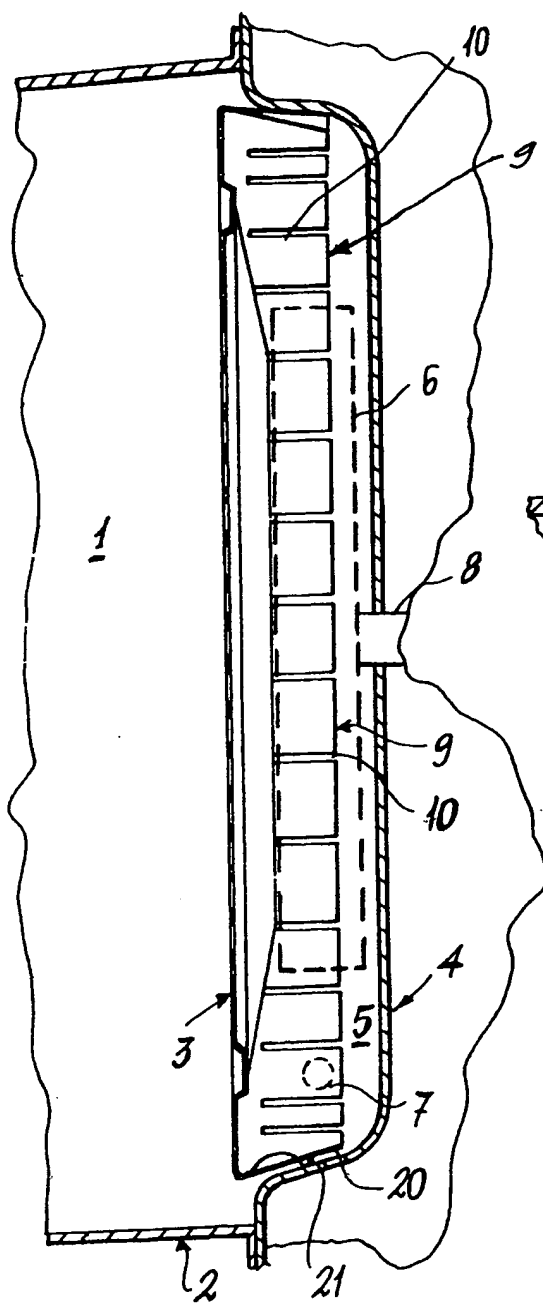


Fig. 2

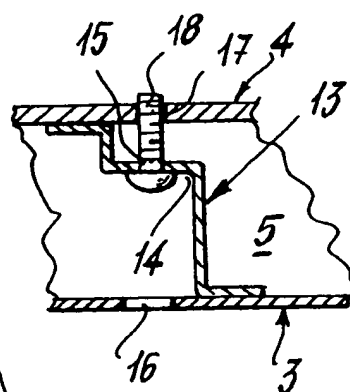


Fig. 4

SPECIFICATION

Removable perforated panel for a domestic microwave oven of the forced hot air circulation type

The invention relates to a removable perforated panel for a domestic microwave oven of the hot air circulation type, in which the panel separates the cooking chamber from an adjacent compartment containing at least one motorised fan and at least one electric heater element for heating the air moved by the fan and circulating from the compartment into the chamber and then back through the perforations in the panel.

In European Patent Application No. 80302636.8, Publication No. 0 023 827, an oven of this type is described in which the perforated wall is fixed peripherally by means of screws between the surrounding flanges of two sheet metal members, one member defining the four sides of the cooking chamber and the other member outwardly defining the rear compartment housing the fan. In order to prevent the microwaves from propagating beyond the panel, its perforations are dimensionally correlated to the wavelength of the microwaves. However, because the edge of the panel and the flanges clamping the panel are disposed on the inside of the insulation which externally surrounds the cooking chamber and, at least partially, the wall member defining the fan compartment, the assembly of the panel during oven manufacture and any maintenance requiring removal of the panel are slow and uncomfortable.

Accordingly, an object of the present invention is to provide a perforated panel for an oven of the type indicated, which can be rapidly and comfortably removed and which substantially prevents outward propagation of the microwaves from the cooking chamber.

According to the invention, the perforated panel is provided with a peripheral wall which is directed towards the compartment and which is provided with transverse slits positioned and dimensioned so as to substantially prevent the microwaves from propagating in peripheral directions along the wall, and a set of spacer elements rigidly attached thereto, each of which is arranged to bring a screw means into alignment with a bore in the panel in order to enable the panel to be secured to an oven wall member outwardly defining the compartment.

In this manner, the panel may be removed and thus access to the electric heater element and fan may be obtained by simply inserting a screwdriver through the bore aligned with the screw means and by rotating the screwdriver until the screw means is unscrewed from the oven wall member. Just like the other perforations, the bore aligned with the screw means is dimensioned so as to prevent passage of

microwaves.

In order to facilitate assembly and construction, the peripheral wall of the substantially rectangular panel, which has rounded corners, is inwardly inclined in the direction of the fan compartment, and an adjacent portion of the oven wall member defining the compartment is substantially correspondingly inclined.

The invention will be more apparent from the detailed description given hereinafter by way of example only, with reference to the accompanying drawings in which:

Figure 1 is a front view of one half of the panel mounted *in situ*;

Figure 2 is a section on the line II-II of *Fig. 1*;

Figure 3 is a section on the line III-III of *Fig. 1*; and

Figure 4 is a section through a spacer element fixed to the panel.

In the Figures, the reference numeral 1 indicates the oven cooking chamber which may be closed at the front in known manner by a door (not shown). The cooking chamber has a shape similar to a rectangular based prism, of which one side is represented by the door, four sides are formed by a sheet metal member 2, and the sixth side, *i.e.* the rear end, is formed at least partially by a perforated metal panel 3. In conjunction with a second sheet metal member 4 this panel 3 defines a compartment 5 which houses a fan 6 and an electric heater element 7. The fan 6 is driven by an electric motor (not shown) supported in any known manner by the member 4 or by another part of the oven structure, only a small part of a drive shaft 8 being shown in the drawing.

The oven is of the type which, for food cooking purposes, also comprises a microwave generator, for example a magnetron, and a wave guide which conveys the microwaves into the cooking chamber. Neither the generator, the wave guide, nor the parts relating to the microwave heating have been shown, as they are of known type and do not form the subject matter of the present invention.

In order to prevent energy dissipation from the cooking chamber 1 through its rear wall, the panel 3 is provided with microwave energy sealing characteristics, and for this purpose: a) its perforations 11, which are essential in order to allow circulation of air from the compartment 5 to the cooking chamber 1 and back from the latter to the former, have a predetermined diameter which is correlated with the free wavelength of the microwaves radiated inside the cooking chamber 1, for example considerably less than one half of the wavelength; and b) it comprises a continuous wall 9 containing a set of transverse slits 10 which are spaced apart by approximately one quarter of said wavelength.

The perforations provided in the panel are

selectively distributed in a number of zones A, B and C. The zone A is disposed in front of the fan 6, and the air (mixed with fumes and vapour) is drawn from the cooking chamber into the compartment 5 through the relative perforations. The two zones B, which are symmetrically disposed about the central zone A and the vertical centre line of the panel, are situated in an inclined part 12 of the panel so that the air (mixed with fumes and vapour) flows from the respective perforations in such a direction that it strikes the side walls of the cooking chamber 1.

Zone C extends along the periphery of the panel, and its perforations are disposed along a continuous line and are subdivided into groups spaced apart from each other. Especially the diameter, but also the distribution and location of the perforations are arranged to substantially eliminate microwave energy losses from the cooking chamber. A fraction of the air (mixed with fumes and vapour) fed by the fan 6 also flows through the perforations of zone C.

Between the continuous wall 9 of the panel 3 and the member 4 there is provided a perimetral gap 20 which is easily obtained by pressing a few indentations 21 through to the outside of the wall 9. A fraction of the air (mixed with fumes and vapour) fed by the fan 6 thus passes through this gap 20, thereby contributing to uniform temperature distribution inside the cooking chamber 1. On the other hand, the perimetral gap 20, which is of the order of only a few millimetres, prevents microwave dispersion into the compartment 5.

The panel 3 can easily be fitted into the oven during oven manufacture and removed when access is required to the elements disposed in the compartment 5. To that side of the metal panel 3 which faces the compartment 5, there are fixed, for example by welding, four identical sheet metal spacer elements indicated by 13 and shaped in the form of steps, as shown in Fig. 4. One of these steps is fixed to the panel, while another intermediate step indicated by 14 comprises a bore 15 aligned with a bore 16 of the panel.

These two bores are themselves aligned with a threaded bore 17 in the member 4 which defines the compartment 5 and against which the third and last step of the spacer element 13 rests. A screw 18, which can be controlled by a screwdrive inserted through the bore 16, passes through the bore 15, rests with its head on the step 14 and screws into the threaded bore 17 in order to keep the panel 3 secured to the member 4. This method satisfies certain safety requirements which forbid the exposure of those means which, when removed, allow access to operational parts of ovens and the like. The slitted wall 9, which is directed towards the compartment 5, converges towards this latter in the sense that its various portions are inclined

such that their ideal extensions would intersect.

The proposed structure on the one hand satisfies those regulations which prevent the exposure of certain means used for the removable connection of component parts and which impose limitations on high frequency energy losses in microwave ovens, and on the other hand satisfies the requirements of easy fitting and removal of the panel to give access to certain operational parts of the oven.

CLAIMS

1. A removable perforated panel for a domestic microwave oven of the forced hot air circulation type, in which the panel separates the cooking chamber from an adjacent compartment containing at least one motorised fan and at least one electric heater element for heating the air moved by the fan and circulating from the compartment into the chamber and then back through the perforations in the panel, characterised in that the perforated panel is provided with a peripheral wall which is directed towards the compartment and which is provided with transverse slits positioned and dimensioned so as to substantially prevent the microwaves from propagating in peripheral directions along the wall, and a set of spacer elements rigidly attached thereto, each of which is arranged to bring a screw means into alignment with a bore in the panel in order to enable the panel to be secured to an oven wall member outwardly defining the compartment.

2. A panel as claimed in Claim 1, characterized in that the peripheral wall of the panel is inwardly inclined in the direction of the fan compartment and an adjacent portion of the oven wall member defining the compartment is substantially correspondingly inclined.

3. A panel as claimed in Claim 1 or 2, characterized in that the panel comprises spaced-apart groups of perforations aligned along an endless peripheral line.

4. A panel as claimed in any previous Claim, characterized in that the panel comprises a first zone of perforations disposed in front of the fan and two further zones of perforations disposed one on each side of the first zone.

5. A panel as claimed in Claim 4, characterized in that each of the two further zones of perforations is situated in a respective portion of the plate which is inclined with respect to the remainder of the plate.

6. A panel as claimed in any previous Claim, characterized in that the spacer elements comprise an intermediate step which is bored and against which the screw means rests.

7. A panel as claimed in Claim 1, characterized in that on the outer face of the peripheral wall there is provided a number of indentations so that a predetermined perimetral gap

remains between the peripheral wall and the oven wall member.

8. A removable perforated panel for domestic microwave ovens, substantially as
5 herein described with reference to the accompanying drawings.

9. A domestic microwave oven provided with a removable perforated panel as claimed in any preceding Claim.

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